The Discovery in the Upper Atmosphere by Means of the   SOV/20-127-1-20/65
Third Sputnik of Electrons Having an Energy of About
10 kev

of the electron fluxes on their "equivalent" energy within the
range of from -42 to -54° geomagnetic latitude in altitudes of
from 1720 to 1880 km in the night of May 15, 1958 above the
southern part of the Pacific. When the sputnik rotated round
its two axes, the intensity of the electron fluxes changed con-
siderably. The electron fluxes are probably the cause of the
heating and expansion of the upper atmosphere (which was de-
duced from the slowing-down of the sputnik). There are 1 fig-
ure and 17 references, 9 of which are Soviet.

ASSOCIATION: Institut fiziki atmosfery Akademii nauk SSSR (Institute for the
Physics of the Atmosphere of the Academy of Sciences, USSR)

PRESENTED: April 14, 1959, by A. I. Berg, Academician

SUBMITTED: April 14, 1959

Card 3/3

SHKLOVSKIY, I.S.

PHASE I BOOK EXPLOITATION   SOV/4281

Iskusstvennyye sputniki zemli, vyp. 4 (Artificial Earth Satellites, No. 4)
Moscow, 1960. 205 p. Errata slip inserted. 6,500 copies printed.

Resp. Ed.: L.V. Kurnosova; Ed. of Publishing House: M.I. Fradkin; Tech. Ed.:
I.P. Polozova.

PURPOSE: This collection of articles is intended to disseminate data collected
in investigations performed by means of artificial earth satellites.

COVERAGE: The collection consists of 15 articles dealing with scientific data on
Soviet artificial earth satellites (AES) and cosmic rockets. The topics dis-
cussed include measurements of the density of the upper atmosphere, motion of
AES, measurements of micrometeorites and meteoric matter, magnetometric measure-
ments of cosmic rays, electrical potential, and spectrum of positive ions. The
collection is part of a series published regularly. References follow each
article.

Artificial Earth Satellites, No. 4   SOV/4281

Shvarts, N.M. Method of Determining Electrical Potential of Bodies in
Plasma   161

Nazarova, T.N. Investigation of Micrometeorites on the Third Soviet AES   165

Istomin, V.G. Some Results of the Measurement of the Spectra of the
Mass of Positive Ions on the Third Soviet AES   171
Measurements were made with a radio-frequency spectrometer on
the third Soviet AES at an altitude of 225 to 950 km and between 27°
and 65° north latitude.

Shafer, Yu.G., and A.V. Yarygin. Measuring Cosmic Rays on Geophysical
Rockets   184

Shklovskiy, I.S. Artificial Comet as a Method of Optical Observation
of Rockets   195
The author describes various kinds of observation and compares
relative errors. He discusses some Soviet and non-Soviet articles
on the subject.

Card 5/6

PHASE I BOOK EXPLOITATION   SOV/4413

International Cosmic Ray Conference, Moscow, 1959.

Proceedings. v. III. Moscow, 1960. 253 p. Errata slip inserted. No. of copies printed not given.

Sponsoring Agency: International Union of Pure and Applied Physics. Cosmic Ray Commission.

Ed.: S. I. Syrovatskiy; Editorial Board: G. B. Zhdanov (Ed.-in-Chief), I. P. Ivanenko (Assistant Ed.-in-Chief), E. M. Geraimova, A. I. Nikishov, V. I. Ostroumov, Yu. N. Vavilov, and A. T. Abrosimov.

PURPOSE: This book is intended for physicists, astronomers and other scientists concerned with the earth's radiation belts and cosmic ray research.

COVERAGE: This is Volume 3 of a 4-volume work containing the proceedings of the Moscow Cosmic Ray Conference held July 6-11, 1959. This volume contains 40 reports on the earth's radiation belts and primary cosmic radiation. The reports delivered by Soviet scientists are abstracted below. References accompany individual reports.

9. Krasovskiy (Krasovskii), V.I., I.S. Shklovskiy (Shklovsky), G. I. Galperin, and I.M. Svetlichnyy (Svetlichny). On Fast Corpuscles of the Upper Atmosphere   59-63
This paper presents experimental data on fast corpuscles of the upper atmosphere and gives a detailed description of the equipment used in the experiment.

11. Dorman, I.I. On the Problem of the Nature of Soft Radiation in the Upper Atmosphere   74-80
This paper summarizes the available data on bursts of soft radiation in the atmosphere and investigates the nature of the bursts in relation to processes on the sun, in corpuscular streams, and in the interplanetary medium. It also investigates the nature of these bursts in relation to the properties of the Earth's belts of radiation.

12. Askar'yan G. A. On the Nature of the External Radiation Belt of the Earth   81-82
It is stated that the external radiation belt encircling the earth is of nuclear origin, but that the explanation of the capture and accumulation of particles by the Earth's magnetic field in the course of its local variations are not convincing, as an explanation of the nature of the external radiation belt. A more convincing explanation of the observed effects is given in this paper.

II. PRIMARY COSMIC RADIATION

22. Charakhch'yan, A.N., and T.N. Charakhch'yan (Lebedev Physical Institute, USSR Academy of Sciences; Nuclear Physics Research Institute, Moscow University). Energy Spectra of Primary Cosmic Particles   129-135
This paper explains the results obtained from low-altitude observations of the electron component of cosmic radiation in the upper layers of the atmosphere.

23. Kocharyan, N.M., G.S. Saakyan, and Z.A. Kirakosyan. Spectrum of Cosmic Radiation.
This is an abstract of the results contained in four independent experiments. The full text has been published in Russian in the Zhurnal eksperimental'noy i teoreticheskoy fiziki, 35, 1335 (1958).   136

PHASE I BOOK EXPLOITATION

SOV/6276

Astronomiya v SSSR za sorok let 1917 - 1957: sbornik statey (Forty Years of Astronomy in the USSR, 1917-1957: Collection of Articles) Moscow, Fizmatgiz, 1960. 728 p. 3,000 copies printed.

Ed.: L. V. Sorokumovskiy Tech. Ed.: N. A. Tumarkina; Editorial Board: A. A. Mikhaylov (Resp. Ed.), M. S. Eigenson, P. P. Parenago, A. G. Masevich, G. A. Shain; V. V. Sobolev, and M. F. Subbotin.

PURPOSE: This book is intended for astronomers, astrophysicists, and others interested in the history of astronomy in the USSR.

COVERAGE: This major work on the history of astronomy in the USSR consists of two parts, review articles and bibliographies. Part I contains a collection of articles on various facets of astronomical research written by leading Soviet specialists in the field. Chief emphasis is placed on developments of the last ten years. The research activities and equipment of 25 Soviet observatories and institutes are described, and the leading scientific personalities of each mentioned. The geographic coordinates and elevations of 41 astronomical centers are listed. Individual articles discuss problems dealing with

...... Ye. P. Latitude Service 67

... M. S. ... Theoretical Astronomy 113

... M. F. ... Physical Conditions on ... and Planets 159

... S. V. (Beresnev), and D. M. ... Comets 177

... Minor Planets 265

... V. V. ... Meteors 173

... Yu. L. Interstellar 137

V. A. 207

.... 251

Kukarkin, B. V. Variable Stars 291

Martynov, D. 423

.... 451

.... Stellar Astronomy 475

.... Origin and Evolution 495

.... 523

Bibliography of Astronomical Works Written in the USSR During 1917-1957 Period. Compiled Under the Direction of N. B. Lavrova

Alphabetical Index of Authors in the Bibliography 571
.... 701
.... 722

Author Index to the Collection of Articles

PART II. BIBLIOGRAPHY

Foreword 573
List of Abbreviations Used for Publication Titles 574
List of Serial Publications 575
Writings of a General Character 578
Popular Literature 583

Card 2/9--

SHKLOVSKIY, I. S.

PHASE I BOOK EXPLOITATION   SOV/4946

Mikhaylov, A. A., ed.

Stantsii v kosmose; sbornik statey (Space Stations; Collection of Articles) Moscow, Izd-vo AN SSSR, 1960. 124 p. 25,000 copies printed. (Series: Akademiya nauk SSSR. Nauchno-populyarnaya Seriya)

Resp. Ed.: A. A. Mikhaylov; Compiler: V. V. Fedorov; Ed. of Publishing House: Ye. M. Klyaus; Tech. Ed.: I. D. Novichkova.

PURPOSE: This book is intended both for the space specialist and the average reader interested in space problems.

COVERAGE: The book contains 73 short articles by various Soviet authors on problems connected with space travel and the launching of artificial earth satellites and space rockets. Some possibilities of future developments are also discussed. The articles were published in the period of 1957-1960. No personalities are mentioned. There are no references.

III. ARTIFICIAL PLANET. FIRST ROCKET ON THE MOON

PHASE I BOOK EXPLOITATION   SOV/...

International Cosmic Ray Conference. Moscow, 1959.

Proceedings. v. III. Moscow, 1960. 253 p. Errata slip inserted. No. of copies printed not given.

Sponsoring Agency: International Union of Pure and Applied Physics. Cosmic Ray Commission.

Ed.: S. I. Syrovatskiy, Editorial Board: G. B. Zhdanov (Ed.-in-Chief), I. P. Ivanenko (Assistant Ed.-in-Chief), N. M. Gerasimova, A. I. Nikishov, V. I. Istomin, B. A. Khvostov, L. I. Dorman, V. F. Tulinov, S. I. Syrovatskiy, V. M. Fedorov, Yu. N. Vavilov, and A. T. Abrosimov.

PURPOSE: This book is intended for physicists, astronomers and other scientists concerned with the earth's radiation belts and cosmic ray research.

COVERAGE: This is Volume 3 of a 4-volume work containing the proceedings of the Moscow Cosmic Ray Conference held July 6-11, 1959. This volume contains 40 reports on the earth's radiation belts and primary cosmic radiation. The reports delivered by Soviet scientists are abstracted below. References accompany individual reports.

III. THE ORIGIN OF COSMIC RAYS

33. Ginzburg, V.L. Some Aspects of the Theory of Cosmic Ray Origin   196-204
This paper elucidates the following problems: 1) The main gas concentration in the galaxy (including the halo). 2)The role of different cosmic ray sources; the injection and particle acceleration mechanism in sources. 3) The mechanism and role of cosmic ray escape from the galactic halo into intergalactic cosmic ray space. 4) The fraction of metagalactic cosmic rays in the Galaxy; space; the nature of cosmic ray movement in the galactic spiral in connection with cosmic ray isotropy and chemical composition 5) The origin of the cosmic ray electron component in the halo.

34. Shklovskiy, I.S. Achievements in Radioastronomy and Radioastronomical   205-210
Theory of the Origin of Cosmic Rays
This paper explains the radioastronomical theory of the origin of cosmic rays on the basis of the latest achievements in radioastronomy.

35. Krymskiy, A.A. and S.I. Syrovatskiy(Syrovatskiy). On the Composition of   211-219
Primary Cosmic Rays
This paper points out the inadequacy in the explanation of the composition of cosmic rays and presents another approach to the solution of this problem.

39. Syrovatskiy (Syrovatskiy), S.I. Possible Acceleration of Charges   233-238
by the Electromagnetic Field of the Magnetic Dipole of the Earth
This paper presents the results of new computations of the electromagnetic field of a rotating dipole, as well as of a ... electron equations pertaining to this field. Questions regarding the interspace between computations in field. Inertial and rotating systems of coordinates are considered, and inertial and rotating conclusions with regard to the nature of distribution of charges around a rotating dipole and with regard to analysis of possible currents are made.

40. Lyubimov, I... On the initial state of charged-particle acceleration in a ...   239-244
The author analyzes the following problems: 1) Injection energy in a solar flare in the case of charged-particle acceleration by the Fermi mechanism. 2) ...

AVAILABLE: Library of Congress

Name   :   SHKLOVSKIY, . I. . S.

Title   :   Doctor of Physico-Mathematical Sciences.

Remarks :   I. . S. SHKLOVSKIY is the author of an article entitled "Here It
             Is, the Artificial Comet!" dealing with clouds of sodium vapors
             released from the second Soviet cosmic rocket.

Source :   M: Stantsii v Kosmose (Stations in Outer Space), a collection of
             articles, published by the USSR Academy of Sciences, Moskva,
             1960, with foreword by Academicians A. N. Nesmeyanov and A.
             V. Topchiyev, p. 275.

                                              72   10

29717
S/169/61/000/008/033/053
A006/A101

3,1730 (1126,1127, 1166)

AUTHOR: Shklovskiy, I. S.

TITLE: Achievements of radioastronomy and the radioastronomical theory of the origin of cosmic rays

PERIODICAL: Referativnyy zhurnal, Geofizika, no. 8, 1961, 8, abstract 8G58 ("Tr. Mezhdunarodn. konferentsii po kosm. lucham, 1959, v. 3", Moscow, AN SSSR, 1960, 209-215)

TEXT: Information is given on the sources of non-equilibrium radio radiation in the Galaxy, arising as a result of synchrotronous emission by electrons moving in magnetic fields. Such sources are: the galactic halo, the spiral structure of the disk in the galactic plane, the region about the Galaxy center and discrete sources, i.e. nebulae arising as a result of supernova bursts. The Sun is in the disk near the edge of the spiral arm; therefore radioastronomical data, pertaining to this area of the Galaxy are of greatest interest. In the closest surroundings of the solar system the concentration of relativistic electrons with $E > 10^9$ ev energy must be $N \sim 3.10^{-13} cm^{-3}$. This conclusion drawn from radioastronomical data is in agreement with the estimate of $N < 6.10^{-13} cm^{-3}$

Card 1/3

Achievements of radioastronomy ...

which follows from the experimentally established fact on the absence of rela-
tivistic electrons in the composition of primary cosmic rays. The spiral struc-
ture of the radio emitting disk develops as a result of the fact that relativistic
electrons originate in the spiral arms of the Galaxy (bursts of second-type
supernovae, nuclear interactions of protons of cosmic rays in the clouds of
interstellar gas) and then diffuse into the halo. Calculations show that in
sources, indentified with second-type supernovae remnants (Cassiopeia A type),
about 10^{49} relativistic electrons are contained with $E > 10^9$ ev, and the total
energy of electrons with $E > 2.10^7$ ev in such an expanding nebula attains about
5.10^{46} erg. The kinetic energy of an expanding nebula and the energy of the
magnetic field enclosed, is about $10^{49} - 10^{50}$ erg. Therefore it can be assumed
that the full energy of relativistic particles (mainly protons) developing
during a supernova burst, attains about 10^{49} erg. It is mentioned that a number
of known, extended regions of enhanced radio emission (Puppis A, Velus X type)
are remnants of supernovae which burst several thousand years ago. Therefore
the galactic disk of radio radiation can be conceived as a totality of such old,
disintegrated supernova remnants. Simultaneously it is noted that the collision
of heavy cosmic ray nuclei with hydrogen nuclei in the spiral arms of the Galaxy
can fully explain the concentration of relativistic electrons observed in the

Card 2/3

29717

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Achievements of radioastronomy ...   A006/A101

disk. This circumstance is most important if one considers that in virtue of maintaining the adiabatic invariant $\sin^2\Theta/H$, the relativistic electrons yielded by the supernova nebulae (where magnetic field H is intense) will not produce noticeable synchrotronous radiation. It is assumed that in the region of the galactic center, first type supernovae are the source of relativistic particles. In this region, concentration of relativistic electrons with $E > 10^9$ ev. attains $N = 1.5 \cdot 10^{-12} cm^{-3}$ and their total amount is about 3.10^{50}. If bursts of first-type supernovae occur once in 10^4 years, then the number of relativistic electrons observed in the region of the galactic center will accumulate within merely 10^7 years. Apparently, the power of relativistic particle sources, located in the galactic spiral arms, exceeds the power of sources concentrated in the region of the galactic center.

N. Kaminer $\mathcal{X}$

[Abstracter's note: Complete translation]

Card 3/3

SHKLOVSKIY, I.S.

Nature of supernovae. Astron.zhur. 37 no.3:369-380 My-Je '60.
(MIRA 13:6)
1. Gosudarstvennyy Astronomicheskiy institut im. P.K. Shternberga.
(Stars, New)

81850

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E032/E514

𝒥. /730

AUTHOR: Shklovskiy, I. S.

TITLE: On the Nature of the Sag-A Source of Radio Emission

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol 37, Nr 3,
           pp 591-592 (USSR)

ABSTRACT: According to recent observations by Drake (Ref 1) it
           is rather probable that strong sources of non-thermal
           radio emission are absent in the galactic nucleus.
           The compact ($\sim 10'$) and very bright source observed in
           the nucleus is apparently of thermal nature and is due
           to ionized gas having a concentration of about 10^3 cm^{-3}.
           Two strong intensity maxima located on the "true
           galactic equator" symmetrically on either side of the
           nucleus and at a distance of about 45' are of a non-
           thermal nature.   It should be noted that these two maxima
           have been observed by Mills (Ref 2) on 3.5 m. However,
           the relatively low resolution employed did not exclude
           other interpretations. Recent high resolution observa-
           tions suggest that non-thermal sources of radio emission

Card 1/6

81850

S/033/60/037/03/024/027
E032/E514

On the Nature of the Sag-A Source of Radio Emission

are distributed in a torus surrounding the galactic
nucleus and having a radius of 100 parsec and a thick-
ness of about 20 parsec. Its plane coincides with the
plane of the "true" galactic equator determined by the
distribution of interstellar hydrogen. The present
author suggests that the distribution of sources of
non-thermal radio emission about the galactic nucleus
can be given a simple explanation. Owing to the high
density of the gaseous interstellar medium in the
neighbourhood of the galactic nucleus, a large
concentration of relativistic electrons cannot be
present in this region, since these electrons would
relatively rapidly lose their energy by collisions with
the hydrogen atoms. The energy losses by relativistic
electrons (in eV/sec) can be represented by a formula
of the form given by Eq (1) in which the first term
represents ionization losses and the second radiation
losses. This formula has been given by Ginzburg in

Card 2/6

81850
S/033/60/037/03/024/027
E032/E514

On the Nature of the Sag-A Source of Radio Emission

Ref 4.   When $n = 10^3 cm^{-3}$ and $E = 10^9$ eV, we find that $dE/dt = 1.1 \times 10^{-3}$ eV/sec and, consequently, an electron is already considerably retarded after about 3×10^4 years.   Since in the whole Galaxy there are about 10^{11} stars of type II population and one type I supernova explodes after approximately each 300 years, it follows that in the neighbourhood of the nucleus, where the number of stars according to Rougoor and Oort (Ref 3) is about 10^8, such explosions will occur at intervals of a few hundred thousand years. This means that the relativistic electrons will be practically completely retarded between these explosions. On the other hand, the inflow of relativistic electrons into the region of the nucleus from the outer regions of the Galaxy is assisted by the presence of a relatively high interstellar magnetic field. Thus, the absence of non-thermal synchrotron radiation in the neighbour-

Card 3/6   hood of the galactic nucleus can be explained quite

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On the Nature of the Sag-A Source of Radio Emission

naturally. Beginning at a distance of about 50 to
100 parsec from the centre, the density of the inter-
stellar gas according to Rougoor and Oort (Ref 3) is
sufficiently small to favour the "accumulation" of
relativistic electrons. At the same time the magnetic
field in this region is still sufficiently large and
possibly larger than in the neighbourhood of the sun
by an order of magnitude. According to Mills (Ref 2)
the brightness temperature of non-thermal radio
emission on 3.5 m in the neighbourhood of the torus
surrounding the galactic nucleus is close to 35 000°.
After the background is subtracted, the brightness
temperature is reduced to about 10 000°. Since the
extension of the emitting region along the line of
sight is about 100 parsec, it follows that
$\Delta T_b/\Delta \ell \approx 100°$K/parsec. On the other hand, according
to Mills (Ref 5), $\Delta T_b/\Delta \ell \approx 2°$K/parsec in the spiral

Card 4/6   arms of the Galaxy as measured on 3.5 m. Since

81850
S/033/60/037/03/024/027
E032/E514

On the Nature of the Sag-A Source of Radio Emission

$\Delta T_b/\Delta \ell$ is proportional to ε_ν, i.e. the spectral density of the radio emission per unit volume, it may be concluded that in the neighbourhood of the Sag-A source ε_ν for non-thermal radio emission is greater by a factor of 50 than in the neighbourhood of the sun. According to the theory of synchrotron radio emission ε_ν is given by Eq (2) if the differential energy spectrum of relativistic electrons is of the form $dN(E) = KE^{-\gamma}dE$. Observations suggest that $\gamma = 2.4$ and hence it follows from Eq (2) that if $H_\perp$ in the neighbourhood of the Sag-A source is greater by a factor of 10 than in the neighbourhood of the sun, then if K remains the same ε_ν will be greater by a factor of 50. As the distance from the centre is increased, the velocity of unordered motions of gaseous masses decreases relatively rapidly and hence the interstellar magnetic field will also decrease. ε_ν will

Card 5/6   decrease even more rapidly.   This may explain the

81850
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E032/E514

On the Nature of the Sag-A Source of Radio Emission

presence of a rapidly sharp boundary in the torus of non-thermal radio emission which surrounds the galactic nucleus. Thus, the Sag-A source of non-thermal radio emission can be explained without assuming a large concentration of relativistic electrons near the centre of the Galaxy. The observed properties of this source are simply a reflection of the specific conditions which exist in the central regions of the Galaxy.

There are 5 references, 1 of which is Soviet and 4 English.

(Note: This is a slightly abridged translation)

SUBMITTED: April 3, 1960

Card 6/6

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E052/E314

AUTHORS: Gringauz, K.I., Kurt, V.G., Moroz, V.I. and
             Shklovskiy, I.S.

TITLE: Results of Observations Obtained with the Aid of
             Charged-particle Traps Mounted on Soviet Cosmic
             Rockets at Altitudes up to 100 000 km

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol. 37, No. 4,
             pp. 716 - 735

TEXT: The ionized gas and energetic electrons in interplanetary
space were investigated with the aid of three-electrode charged-
particle traps mounted on three Soviet cosmic rockets. These traps
are the result of further development of instruments based on
probe methods. Four three-electrode ion traps were mounted on the
spherical container carried by the first Soviet cosmic rocket
launched in the direction of the Moon on January 2, 1959. Each trap
consisted of three hemispherical and concentrically-mounted
electrodes whose radii were 60, 22.5 and 20 mm, respectively.
The two outer electrodes were fine metal grids, while the third
electrode was continuous and served as the collector of the charged
particles. The potentials relative to the body of the container

Card 1/9

83233
S/033/60/037/004/009/012
E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

were as follows: collector 90 V; intermediate grid g_1 -- 200 V;

the outer grid g_2 + 10 V and 0 V in the case of two of the four

traps. The potential of the outer grids of the other two traps
was +15 V and their collectors were connected together. The
general arrangement of electrodes in these three-electrode ion
traps is indicated in Fig. 1. The first grid (g_1) served to
suppress the photocurrent from the collector produced under the
action of the solar radiation and other radiations incident on the
collector. This grid also suppresses secondary electrons emitted
by the collector. All the traps were located in the meridional
plane of the container. Different potentials were given to the
outer grids in order to estimate the energy of the positive
particles entering the traps and, in particular, to distinguish
between currents due to stationary gas particles (energies of
the order of 1 eV) and currents due to protons in the corpuscular
streams, whose energies are higher by two or three orders of

Card 2/9

83233
S/033/60/037/004/009/012
E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

magnitude. Current amplifiers were provided and positive currents
between 10^{-10} and 5×10^{-9} and negative currents between 10^{-10}
and 2×10^{-9} A could be measured. In the case of the second cosmic
rocket the potentials of the outer grids (g_2) were -10, -5, 0
and 15 V, respectively. The collectors and the inner (anti-
photoelectric) grids were plane. The traps were located at the
corners of a tetrahedron inscribed into a sphere. In these
traps the photoelectrons due to solar radiation and emitted from
the outer grid do not reach the collector and the collector photo-
current is completely suppressed by the electric field between the
collector and the inner grid. Photoelectrons from the latter are
partly ejected from the trap or strike the outer grid and are
partly intercepted by the collector giving rise to a negative
current in the collector circuit. In this way, the negative current
in the collector circuit due to the illumination of the inner grid

Card 3/9

83233
S/033/60/037/004/009/012
E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

was reduced by an order of magnitude compared with the traps
mounted on the first rocket. Most of the aluminium surface of
the container was covered by an Al_2O_3 coating (or film). If the potential

on g_2 is less than kT/e then the positive ions due to the
stationary interplanetary gas penetrate into the space bounded
by g_2, are accelerated in the field between g_1 and g_2 and,

on passing through g_2, enter the collector. Thus "0 volt",

"-5 volt" and "-10 volt" traps should record ions due to the
stationary plasma which would be larger for lower values of the
potential on g_2. If the latter is very much greater than

kT/e, then the ions will not pass through g_2 and the +15 V trap

will not record ions due to the stationary gas with a temperature
of, say, 10 000 $^{\circ}K$. The electrons due to the ionised gas do not
enter the collector since they are ejected by the field between
Card 4/9

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E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

g_2 and g_1 (200 V). However, energetic electrons belonging to
the radiation belts cannot be stopped by the g_1 grid and
electrons with energies greater than 200 eV give rise to negative
collector currents. Measurements obtained with these traps were
corrected for the effect of the potential of the container and
its motion. Fig. 6 shows the currents measured on September 12,
1959 at altitudes up to 25 000 km, using traps with $V_{g_2} = 0$ and

+15 V. The translational motion of the container is accompanied
by the simultaneous rotational motion and hence the
orientation of each trap relative to the velocity of the container
and the direction of the Sun varies continuously. The maximum and
minimum values of the collector current correspond to certain
definite orientations of the container. In order to exclude the
effect associated with the rotation of the container, the

Card 5/9

83233

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Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

experimental results can be shown in the form of curves
connecting the maximum and minimum values of the collector
currents. In Fig. 7, Curves 1, 2, 3 and 4 are the upper limits
of the recorded values of collector currents with the potential
of the outer grids relative to the container equal to -10, -5, 0
and +15 V, respectively. Curve 5 is the lower boundary of the
collector currents for three traps, in which the potential of the
outer grid relative to the body of the container was negative or
zero. These curves show the considerable dependence of the current
due to positive particles reaching the collector on the potential
of the outer grid. At altitudes exceeding 3 000 km the positive
potential of the outer grid retards the positive ions almost
entirely and prevents them from reaching the collector. The lack
of similarity between Curves 1, 2 and 3 can be ascribed to changes
in the orientation of the traps relative to the velocity vector
and the direction of the Sun. Fig. 8 shows the data obtained with
the second cosmic rocket. The upper continuous curve shows the

Card 6/9

83233

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E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

upper boundary of the measured values of the currents in three
traps with the outer grid potentials negative and zero. The dotted
curve represents the upper boundary of the values of the collector
current for the trap with outer grid potential euqal to +15 V.
The lower curve is the lower boundary of the measured collector
currents in all the traps. In this part of the trajectory (25 000
- 100 000 km) the positive collector currents are practically absent
from all the traps while near 60 000 - 70 000 km the collector
currents in all the traps are simultaneously negative. Fig. 9 shows
the upper boundary of the values of collector currents for traps
with negative and zero outer grids, respectively. The crosses refer
to V_{g_2} = -10 V and the open circles to V_{g_2} = 0 V. These were
recorded using traps mounted on the first cosmic rocket. Fig. 10
shows the currents for the "25 V" and the "-10 V" traps recorded
at altitudes up to 8 000 km. The '25 V" results are represented
by the triangles and the "-10 V" results by the points. These results

Card 7/9

83233

S/035/60/037/004/009/012
E032/E314

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

are still being examined. The final conclusions are summarised
as follows:

1) the Earth is surrounded by a plasma having an ion
concentration of $\sim 10^3$ cm^{-3}, which extends to R $\cong$ 22 000 km.
The density of this plasma, which can be looked upon as the ionised
component of the "geocorona", decreases regularly with altitude.

2) The concentration of interplanetary ionised gas in the neigh-
bourhood of the Earth is less than 100 cm^{-3} and very probably less
than 30 cm^{-3}.

3) In the region of the radiation belt there are few electrons
having energies greater than 200 eV. In the region between 55 000
and 75 000 km, the concentration of these electrons reaches a
maximum. It follows that the energy spectrum of the electrons in
the region of the maximum of the outer radiation belt is much
harder than beyond its outer boundary.

4) A new radiation belt has been established. This belt surrounds
the Earth and is located between 55 000 and 75 000 km. It consists

Card 8/9

83233

S/033/60/037/004/009/012

Results of Observations Obtained with the Aid of Charged-particle
Traps Mounted on Soviet Cosmic Rockets at Altitudes up to
100 000 km

of electrons with relatively low energy (although greater than
200 eV). Further studies of this new radiation belt are said
to be urgently required.
There are 11 figures, 1 table and 26 references: 1 German,
10 English and 15 Soviet.

ASSOCIATIONS: Radiotekhnicheskiy institut Akademii nauk SSSR
                (Radiotechnical Institute of the Ac.Sc., USSR)
                Gos. astronomicheskiy in-t im. P.K. Shternberga
                (State Astronomical Institute imeni
                P.K. Shternberg)

Card 9/9

84921

9.9100 (2101, 1041, 1046)

S/C35/60/037/005/019/024
E032/E314

AUTHORS: Shklovskiy, I.S., Moroz, V.I. and Kurt, V.G.

TITLE: On the Nature of the Earth's Third Radiation Belt

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol. 37, No. 5,
pp. 931 - 934

TEXT: Results obtained with the aid of ion traps set up on
Soviet cosmic rockets indicate the presence of a third (outermost)
radiation belt (Ref. 1). This belt consists largely of relatively
soft electrons with energies greater than 200 eV. In the region
of the so-called second radiation belt and up to altitudes of
about 50 000 km the flux of electrons with energies greater than
200 eV is less than 2×10^7 cm^{-2} sec^{-1}. On the other hand, in
the region 55 000 < R < 75 000 km the flux is about
2×10^8 cm^{-2}sec^{-1}. Thus (as was shown in Ref. 1), the second
belt should consist mainly of electrons having relatively high
energies (a few hundreds of keV) and these electrons move in the
magnetic trap. The problem therefore arises as to what is the
nature of the electrons forming the third (outermost) radiation

Card 1/3

84934
S/C33/60/037/005/019/024
E052/E314

On the Nature of the Earth's Third Radiation Belt

belt. In this connection it must be emphasised that both during
the January and September launchings of Soviet cosmic rockets the
solar activity and the magnetic disturbances were at a low level.
However, there are grounds for supposing that even during periods
of low activity the Sun constitutes a source of a permanent though
relatively weak corpuscular emission, i.e. it gives rise to the
so-called "solar wind". It is argued that the third radiation belt
is formed as a result of the interaction of this "solar wind" and
the Earth's magnetic field, and this leads to a redistribution of
the energy, resulting in a net transfer from the protons to the
electrons. The third radiation belt is a formation characteristic
of magnetically quiet periods, when solar activity is low. It may
be expected that during periods of high solar activity, when
intense corpuscular streams reach the Earth's atmosphere, both the
third and second belts will be deformed, and their characteristics
will be strongly affected. It is suggested, therefore, that the
experiments should be repeated at periods of high solar activity.

Card 2/3

87243

3.1730 (1126, 1127, 1129)

6.9417

S/033/60/037/006/001/022
E032/E514

AUTHOR: Shklovskiy, I. S.

TITLE: Radio Galaxies

PERIODICAL: Astronomicheskiy zhurnal, 1960, Vol.37, No.6,pp.945-960

TEXT: The present paper is sub-divded into the following
sections: 1) Critique of the hypothesis of colliding galaxies;
2) Cygnus A and Centaurus A as sources of the same type but at
different stages of evolution; 3)   The nature of radio galaxies.
In the first section the author argues against the collision
mechanism as a reason for the radio emission of the Cygnus A source.
Thus, the spectrum of Cygnus A obtained by Minkowski with a slit
position angle of 90° (Ref.1) (the slit intersected both the bright
condensations which were interpreted by this author as the
colliding galaxies) does not indicate the presence of any difference
in the radial velocities of these condensations. From this it may
be concluded that the relative radial velocity of the two
condensations cannot exceed 100 to 200 km/sec. On the other hand,
on the present scale of metagalactic distances the distance of
Cygnus A is about 220 Mpc.   Burbige (Ref.6) and Shklovskiy (Ref.7)
have estimated the minimum value of the energy of relativistic

Card 1/6

87243

S/033/60/037/006/001/022
E032/E514

Radio Galaxies

particles and the magnetic field in this source on the basis of the
synchrotron radiation theory.   Using the present scale of distances,
this minimum energy was found to be of the order of 5×10^{60} erg
(Ref.6). According to the colliding galaxy hypothesis, the kinetic
energy of interstellar gas should serve as the source of energy of
the relativistic particles and of the field. If one accepts the
interpretation given by Minkowski and Baade in Ref.1 that the
colliding galaxies are in fact gigantic spirals of late types, then
the mass of the gas in them can hardly exceed $\sim 2 \times 10^{43}$ g. In
order to satisfy the various energy relationships, it is necessary
to assume that the relative collision velocity should be greater
than 7000 km/sec. Comparison of this figure with spectroscopic
data for Cygnus A clearly shows that the colliding galaxy hypothesis
cannot be correct.   Next, Cygnus A has an absolute magnitude of
21.3.   V. A. Ambartsumyan has frequently emphasized that the
probability of collision of two gigantic galaxies is negligible so
long as collisions between galaxies with ordinary characteristics
remain unobserved.   Ambartsumyan has also drawn attention to an
important feature of radio galaxies, namely, the fact that they are
Card 2/6

87243

S/033/60/037/006/001/022
E032/E514

Radio Galaxies

all objects with exceptionally high optical luminosity. This fact
contradicts the colliding galaxy hypothesis and can be used as one
of the arguments in support of the theory that radio galaxies form
a special class of galaxies.   Moreover, observations suggest that
the emission line λ 3727 originates from a gas cloud whose linear
dimensions are of the order of 30 kpc.   Even if the kinetic
temperature is very high, it can be shown that the electron and
even proton concentration should not be less than 0.05 cm^{-3}. It
follows that the mass of the interstellar gas in Cygnus A should be
of the order of 3 x 10^{10} M$_\odot$ or even more. A galaxy with such a
high amount of gas in it can only be a very peculiar object. It
seems improbable that two peculiar galaxies with such exceptionally
high gas contents should collide. One of the basic arguments put
forward in support of the colliding galaxy hypothesis in the case
of Cygnus A is the existence of two bright condensations close to
each other in that source, and this is interpreted as representing
the nuclei of two colliding galaxies. However, the present author
pointed out as far back as 1953 (Ref.2) that this can be interpreted
as a single peculiar galaxy with a wide dark band across the middle,

Card 3/6

87243
S/033/60/037/006/001/022
E032/E514

Radio Galaxies

similar to NGC 5128.   The linear dimensions of this band in both
galaxies are almost the same.   Latest radio astronomical observations
undoubtedly suggest that Cygnus A and Centaurus A give rise to radio
emission of the same type.   One would, therefore, expect that the
galaxies Cygnus A and NGC 5128 are, in fact, related objects.
Moreover, NGC 5128 can in no way be considered as a system of
colliding galaxies.   It is thus concluded that the Cygnus A source
is either a peculiar galaxy of high luminosity and large mass with
a wide dark band across its middle or, more probably, a multiple
system with closely located nuclei. Using the theory of the
decrease of brightness of expanding sources of synchrotron emission,
it is shown that the extended source Centaurus A is a source
similar to Cygnus A but in a later stage of evolution. Hercules A
and Hydra A belong to the same type of source. Using the theory
developed by the present author in Ref.15, it is estimated that the
age of the Cygnus A source is about 10^7 years and the age of
Centaurus A is between 10^8 and 3×10^8 years.   The final conclusion
is that all the radio galaxies are objects similar to Cygnus A and

Card 4/6

87243

S/033/60/037/006/001/022
E032/E514

Radio Galaxies

Centaurus A but at different evolutionary stages. Using Cygnus A,
Centaurus A and Virgo A as examples, it is shown that magnetized
gas clouds (plasmoids) containing a large number of relativistic
particles are ejected from the nuclei of these galaxies. The
directions of ejection are, according to comparisons with
observational data, close to the axes of rotation of these
galaxies. These ejected clouds form extended sources of radio
emission and are located symmetrically with respect to the parent
galaxies. They expand with velocities of the order of 10^8 cm/sec
and show a considerable decrease in their radio luminosity, and
particularly brightness, in about 10^7 - 18^8 years. Supernovae are
the most probable sources of relativistic particles in the central
regions of galaxies. Since heavy elements are formed during such
explosions, the total number of relativistic particles forming in a
radio galaxy during its evolution can be estimated empirically from
the observed chemical composition. It has been shown that at the
early stage of evolution every galaxy (including our own) has all
the characteristics of a radio galaxy. In radio galaxies of the
Cygnus A and Centaurus A type, the process of nucleogenesis,
Card 5/6

67243
S/033/60/037/006/001/022
E032/E514

Radio Galaxies

which is accompanied by the ejection of an enormous number of relativistic particles, was more rapid than in our own galaxy by several orders of magnitude and this is explained by their large mass. In the final section the density of relativistic particles in the various regions under consideration is estimated and it is concluded that the process of formation of galaxies from a diffuse gaseous medium is still continuing and is a permanent phenomenon in metagalaxy. There are 36 references: 12 Soviet and 24 non-Soviet.

ASSOCIATION: Gos. astronomicheskiy in-t imeni P.K. Shternberga
(State Astronomical Institute imeni P.K.Shternberg)

SUBMITTED: June 8, 1960

Card 6/6

SHKLOVSKIY, I.S., professor

Is it possible to communicate with intelligent beings of
other planets? Priroda 49 no.7:21-30 Jl '60.
(MIRA 13:7)

(Life on other planets)

81700
S/020/60/132/05/25/069
B014/B125

3. 9000

AUTHORS: Gringauz, K. I., Kurt, V. G., Moroz, V. I.,
               Shklovskiy, I. S.

TITLE: An Ionized Gas and Fast Electrons in the Vicinity of the
               Earth and in Interplanetary Space

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 132, No. 5,
               pp. 1062 - 1065

TEXT: As the results of the second Soviet cosmic rocket indicate, the
first half of its orbit can be divided into four parts. The first ex-
tends to a distance from the earth R = 22,000 km. Significant positive
collector currents occur at all traps with negative or zero potentials.
In the second part, from 22,000 km to 50,000 km, the collector currents
varied between zero and several negative values. In the range from
50,000 km to 70,000 km (third part) negative currents occur in all
traps. With R greater than 70,000 km (fourth part) the currents vary in
all traps between 0 and $5 - 6 \cdot 10^{-10}$ a. These results agree in all three

Card 1/3

An Ionized Gas and Fast Electrons in the   S/020/60/132/05/25/069
Vicinity of the Earth and in Interplanetary   B014/B125
Space

81700

Soviet cosmic rockets. Further the estimation of the ion concentration
was dealt with according to the data and it was determined that one
must know the potential of the receiver in this connection. This poten-
tial depends on the fluxes of high-energy electrons ($>$ 200 ev) and the
most important information on this was obtained with the help of the
measurements of the three-electrode traps. From an extensive investi-
gation it is seen that in the first part of the orbit the flux of elec-
trons with an energy higher than 200 ev does not exceed $2 \cdot 10^7$ $cm^{-2} \cdot sec^{-1}$.
Only electrons with more than 200 ev (flux $1 \cdot 10^8$ - $2 \cdot 10^8$ $cm^{-2} sec^{-1}$)
were found in the third part of the orbit. The existence of a third
radiation belt, the lower boundary of which was at 30,000 km on
February 2, 1959, follows from the characteristics of the results dis-
cussed here. Further, the influence of the photoelectric effect induced
by ultraviolet solar radiation on the potential of the receiver is in-
vestigated. As calculations show, the potential differs from zero only
by several volts when with n_i representing the ion concentration in

Card 2/3

An Ionized Gas and Fast Electrons in the   S/020/60/132/05/25/069
Vicinity of the Earth and in Interplanetary B014/B125
Space

the plasma, $n_i \geq 10$ cm^{-3} and temperature is not too high ($T = 10^4$ °K).

Reference is made to the existence of the plasma of the earth corona, which is found at about R = 15,000 km. Calculated and experimentally determined concentration distributions of the ions as dependent on R are graphically represented in Fig. 3. A steep drop of the ion concentration begins at 15,000 km; this fact requires more exact study. Only an upper limit of 30-60 cm^{-3} can be given for the ion concentration in the range of R greater than 22,000 km. The authors mention among others V. G. Fesenkov (Ref. 10). There are 3 figures and 12 references: 7 Soviet, 3 American, 1 English, and 1 German.

PRESENTED: March 1, 1960, by A. L. Mints, Academician

SUBMITTED: February 24, 1960

Card 3/3

40443

3, 5/3/

3, 2720

P/048/61/000/003/002/004

I004/I204

AUTHORS   Gringauz, K. I., Kurt, W. G., Moroz, W. I., Szkolwski, I. S

TITLE   Ionized gas and fast electrons in the vicinity of Earth and in in interplanetar space

PERIODICAL   Astronautyka no. 3, 1961, 8—10

TEXT   The purpose of this work is to analyze the distribution and nature of radiation in the space surroun-
ding earth with regard to the resultant danger to manned space flights. Data gathered by the second
Soviet cosmic rocket show that four different concentrations of ions can be distinguished along the first half
of its trajectory. In the first portion, extending up to R = 22,000 km (R — the distance from the surface of
earth), all counters with negative or zero potential registered high positive collector currents while in counters
with + 15 v charge relative to the housing, the currents were either small and negative or zero. In the second
portion, between 22,000 and 50,000 km, the collector currents varied between zero and negative values. The
third portion, 50,000 — 70,000 km, showed negative current in all traps. Above 70,000 km current values
were as in portion 2. The current variations in the " + 15 V" trap indicate that the electron flux in the outer
radiation belt is below $2 \cdot 10^7$ cm^{-2} sec^{-1}. This contradicts the established idea that there exist large electron
streams of E ≈ 20 to 30 kev in the maximum region of the outer radiation belt. It is assumed that the density
of the kinetic energy of the electrons there, is by several orders of magnitude smaller than the energy density
of the magnetic field of earth. There are 3 figures.

Card 1/1

9,9100

25989
S/560/61/000/006/007/010
E032/E114

AUTHORS: Gringauz, K.I., Kurt, V.G., Moroz, V.I., and
Shklovskiy, I.S.

TITLE: Ionized gas and fast electrons in the earth's
neighbourhood and in planetary space

PERIODICAL: Akademiya nauk SSSR. Iskusstvennyye sputniki Zemli.
No. 6. Moscow, 1961. pp. 108-112

TEXT: This paper was first published in Doklady AN SSSR,
Vol.132, page 1062, 1960.
K.I. Gringauz, V.V. Bezrukikh, V.D. Ozerov and R.E. Rybchinskiy
(present issue, page 101 - Ref.1) showed that the first half of
the trajectory of the second Soviet space rocket can be divided
into four parts, namely: 1) distances up to R = 22000 km (R is
the distance from the earth's surface) where all the traps with
negative or zero potential recorded appreciable collector currents,
while the trap whose potential relative to the body was + 15 V
showed either very small negative currents or no current at all;
2) distances in the range 22000-50000 km, where collector currents
in all the traps varied between zero and some negative values

Card 1/ 6

Ionized gas and fast electrons .....

25989
S/560/61/000/006/007/010
E032/E114

($I_c < 6$ x 10^{-10} amp); 3) distances in the range 50000-70000 km where negative currents were recorded in all the traps and the absolute maximum and minimum currents were 10^{-9} and 3 x 10^{-10} amp respectively; 4) distances greater than 70000 km where currents in all the traps oscillated between zero and approximately -- (5-6) x 10^{-10} amp, which apparently represents the maximum photoelectric current due to the inner grid which is intercepted by the collector. The overall trend of the results was found to be the same for all the three flights of Soviet space rockets. Analysis of all the results has led the present authors to the scheme indicated in Fig.2 in which 1 is the 'inner' belt, 2 is the 'outer' belt, 3 is the third belt (now postulated), and 4 is the geomagnetic equator. In the region of between 50000 and 70000 km the negative currents of all the traps, which reached 10^{-9} amp, can only be explained by electrons with energies in excess of 200 eV and $N_e \sim 10^8$ - 2 x 10^8 $cm^{-2}sec^{-1}$. The third belt therefore consists of relatively low energy electrons which explains why previous experiments did not detect its presence. Experiments carried out from the third Soviet artificial satellite (Ref.8: V.I. Krasovskiy, I.S. Shlkovskiy, Yu.I. Gal'perin, Ye.M. Svetlitskiy, Dokl. AN SSSR, V.127, 78, 1959) Card 2/ 6

Ionized gas and fast electrons ......

25989
S/560/61/000/006/007/010
E032/E114

at R = 1800 km and above moderate geomagnetic altitudes indicate the presence of electrons with about 10 keV (up to 3×10^8 cm^{-2}sec^{-1}). This may mean that in the region of the radiation belts the concentration of soft electrons is a minimum. However, the experiment reported in Ref.8 was not simultaneous with that described in the present paper. The readings of the trap with zero potential over the first section of the trajectory can be used to estimate the plasma ion concentration. Fig.3 shows the plasma ion concentration as a function of the distance from the earth's surface [1 - theoretical distribution with $T = 1.8 \times 10^3$; 2, 3, 4 - experimental results with $T = 1800$, 1000 and 5000° respectively; points a and b represent measurements at 470 and 800 km respectively (third artificial earth satellite)].
It follows from Fig.3 that the plasma is not the interplanetary ionized gas, and in fact it is an extended shell which is a part of the ionized component of the outermost part of the earth's atmosphere, i.e. that so called geocorona.
There are 3 figures and 12 references: 7 Soviet and 5 non-Soviet. The four most recent English language references read as follows:

Card 3/6

25989
Ionized gas and fast electrons S/560/61/000/006/007/010
E032/E114

Ref.3: J.A. Van Allen, L.A. Frank. Nature, V.183, 430, 1959.
Ref.5: J.A. Van Allen, L.A. Frank. Nature, V.184, 219, 1959.
Ref.6: J.A. Van Allen, C.E. McIlwain, G.H. Ludwig.
      J. Geoph. Res., V.64, 271, 1959.
Ref.11: H.C. van de Hulst. Light Scattering by Small Particles.
      London, 1957.

Card 4/6

25990
S/560/61/000/006/008/010
E032/E314

9.9100

AUTHORS: Krasovskiy, V.I., Shklovskiy, I.S., Gal'perin, Yu.I.,
            Svetlitskiy, Ye.M., Kushnir, Yu.M. and
            Bordovskiy, G.A.

TITLE: Discovery of Approximately 10 keV Electrons in the
            Upper Atmosphere

PERIODICAL: Akademiya SSSR. Iskusstvenyye sputniki Zemli.
             No. 6. Moscow, 1961, pp. 113 - 126

TEXT: Prior to experiments carried out with the aid of
artificial Earth satellites, it was assumed that the natural
glow, heating, and ionization of the upper atmosphere was largely
due to hard electromagnetic radiation of solar origin. It was
considered that corpuscular radiation (protons, α-particles and
electrons) could only penetrate the atmosphere in the polar
regions and thereby give rise to geomagnetic disturbances and
aurorae. It was found that aurorae were frequently initiated
by protons with a considerable velocity spread. However, in
many cases, hydrogen-emission was not observed and the appearance
of aurorae was provisionally associated with electrons having

Card 1/7

25990
S/560/61/000/006/008/010
E032/E314

Discovery of ....

energies up to a few hundreds or thousands of eV. An attempt
was then made by Krasovskiy et al (Ref. 3 - UFN, 64, 425, 1958)
to detect these electrons from the third Soviet artificial
Earth satellite. The apparatus employed consisted of two very
thin phosphors covered by aluminium foils. The scintillations
were recorded by photomultipliers and the amplified photo-
multiplier signal was stored and later telemetered to Earth.
Owing to the presence of the aluminium foils (which were of
differing thicknesses) it was possible to estimate both the
intensity and the energy of the electrons which were most
effective in exciting the phosphors. A particular feature of
this apparatus was that it was sensitivie only to electrons and
did not respond to protons and photons of comparable energy.
The apparatus indicated the presence of large electron currents
at altitudes up to 900 km in the region of the southern part of
the Pacific Ocean, the energy of these electrons being of the
order of 10 keV. These currents were often so large that the
apparatus gave off-scale readings since such high currents were
not expected. In the case of these off-scale readings the energy

Card 2/7

25990
S/560/61/000/006/008/010
E032/E314

Discovery of ....

flux exceeded 100 erg cm^{-2}sec^{-1} at altitudes up to 1 900 km
from the Earth's surface. Fig. 2 shows the calibration curves
for the two detectors employed in this experiment. The dashed
lines correspond to aluminium foil of 0.8 x 10^{-3} g/cm^2 and the
continuous lines correspond to aluminium foil of

0.4 x 10^{-3} g/cm^2. The numbers on these lines indicate the
energy of the electrons in keV. These calibration curves
were obtained in laboratory experiments using parallel beams
of mono-energetic electrons. The current density of monochromatic

electrons (A/cm^2) is plotted along the vertical axis and the
telemetric channel number, which is proportional to the
logarithm of the photomultiplier current, along
the horizontal axis. Fig. 3 shows the difference ΔK between
the logarithmic-scale divisions of the two detectors as a
function of the energy of the electrons used in the calibration.
The ratio of the photo-currents of the two detectors depends
on the energy of the electrons or, more precisely, on the form
of the energy spectrum. This relation was determined in

Card 3/7

25990
S/560/61/000/006/008/010
E032/E314

Discovery of ....

preliminary laboratory experiments with mono-energetic electrons.
The form of the energy spectrum recorded by the satellite is
unknown and comparison of the readings produced by the two
detectors can only be used to estimate an equivalent energy.
This equivalent energy E_{equiv} is defined as the energy of a
monochromatic beam which gives the same photo-current ratio for
the two detectors as the observed value. Proceeding along
these lines one can also define an equivalent current and an
equivalent energy flux. It can easily be shown that these
equivalent quantities give, in fact, the lower limits of the
measured quantities. Consideration of the telemetric records,
a number of which are reproduced in the present paper, showed
that the most frequently recorded energies occurred in the
neighbourhood of 14 keV. Since the sensitivity of the
apparatus is considerably higher for high-energy electrons, it
follows that in the case of non-monochromatic electrons the
maximum flux corresponds to an energy below 14 keV. This
maximum can be determined if some energy-distribution function

Card 4/7

25990
S/560/61/000/006/008/010
E032/E314

Discovery of ....

is assumed. It is estimated that the energy flux associated with these currents, which may reach the lower layers of the atmosphere, is at least 1 erg $cm^{-2} sec^{-1}$. The discovery of large currents of 10 keV electrons is of particular importance to the understanding of many geophysical phenomena. For example, it is interesting to note that appreciable intensities of such electrons first appear at the geomagnetic latitude at which increased ionization was previously recorded in the F-layer and which could not be explained by hard electromagnetic radiation of solar origin. The existence of these electron currents may lead to the explanation of ionization irregularities in the upper atmosphere. Acknowledgments are made to S.Sh. Dolginov, V.V. Beletskiy and Yu.V. Zonov for determining the orientation of the apparatus relative to the magnetic field. There are 11 figures and 15 references: 12 Soviet and 3 non-Soviet.

SUBMITTED: December 9, 1959

Card 5/7

SHKLOVSKIY, I.S.;   FIKEL'NER, S.B.

On F.Hoyle's article "Problem of radio sources."   Astron.
zhur. 38 no. 1:196-198 Ja-F '61.   (IRA 14:2)
                    (Radio astronomy)

3.2430 (1559, 1482)

29302
S/053/61/075/002/007/007
B125/B102

AUTHOR: Shklovskiy, I. S.

TITLE: Ultraviolet radiation and soft X-radiation of the Sun

PERIODICAL: Uspekhi fizicheskikh nauk, v. 75, no. 2, 1961, 351 - 388

TEXT: The results of ionospheric observations of ultraviolet radiation
of the Sun are compiled in Table 1. Ya. P. Al'pert (ZhETF 18, 995 (1948))
found $Q_{Allen}^{observ} = 4 \cdot 10^{10} cm^2 sec^{-1}$ for the F_2 layer. According to observation
data, there is an inversion of the kinetic temperature in the upper layers
of the solar atmosphere (upper chromosphere and corona). The solar corona,
regarded as a very hot plasma, is a source of ultraviolet radiation and
soft X-radiation. On the periphery of the solar disc, the brightness of
ultraviolet light must vary discontinuously as the corona is transparent to
the proper ultraviolet radiation, and the Sun shields off a considerable
part of this radiation. The far ultraviolet solar radiation originates
almost entirely from the corona. The corona is not transparent to the
allowed ultraviolet and X-ray lines originating in it. Above the active   ✗

Card 1/4

29302
S/053/61/075/002/007/007
B125/B102

Ultraviolet radiation...

radiation, the corona is especially thick and there are probably more or less bright "spots" of ultraviolet and soft X-radiation. The second part of the present paper presents a review of the principal results of observations of the ultraviolet and soft X-radiation of the Sun by means of rockets and artificial satellites. A. V. Yakovleva et al. (Izv. AN SSSR, ser. geofiz. 9, 1099 (1958)), G. S. Ivanov-Kholodnyy, G. M. Nikol'skiy (Astron. zh. 38, 45 (1961)) are mentioned. In 1961 it has been found that the upper chromosphere and the intermediate region between corona and chromosphere make the greatest contribution to the ultraviolet region $912 < \lambda < 1000$ Å. A considerable temperature gradient seems to exist between the upper chromosphere and the inner corona. The fluxes of very hard X-ray-quanta of dozens and hundreds of kv are a new, very interesting phenomenon, which can last for some minutes. The energy flux of photons of >20 kev amounts to $\sim 5 . 10^{-6}$ erg/cm^2. These photons penetrate into the Earth's atmosphere down to an altitude of ~ 45 km. The third part deals with the influence of hard solar radiation upon the ionization of the Earth's atmosphere. Only the most general considerations concerning the origin of the various ionospheric layers are taken into account. The most

Card 2/4

Ultraviolet radiation...

29302
S/053/61/075/002/007/007
B125/B102

intense emission beyond the edge of the Lyman Series is concentrated a) immediately near the edge in the region $912 > \lambda > 850$ Å; (This radiation is caused by the upper layers of chromospheric floccules.) b) in the radiation beyond the edge of the ionized helium series; (This radiation originates from the intermediate radiation of the solar atmosphere.) c) in many other bright lines, the brightest of which are due to He I, O II, O III, O IV, O I, N IV, and C III. Also these lines originate from the intermediate region. In the formation of the ionospheric F layer, hard corona radiation is of minor importance. The E layer is due to the photoionization of oxygen and nitrogen by the hard corona radiation $\lambda < 75$ Å. Observations during total solar eclipses clearly show that the hard photon radiation that ionizes the E layer originates from the corona. Experimental and theoretical results are in good agreement. The results of rocket astronomy and of the theory of the solar corona and chromosphere permit an explanation of all the phenomena observed in the Earth's atmosphere. There are 23 figures, 3 tables, and 52 references: 12 Soviet and 40 non-Soviet. The three most recent references to English-language publications read as follows: G. Elwert, J. Geophys. Res. 66, 391 (1961); Sky and Telescope 20, no. 3, 143 (1960); A. S.

Card 3/4

SHKLOVSKIY, Iosif Samuilovich; MAZIN, I.P., red. izd-va; MAKUNI, Ye.V., tekhn. red.

[Universe, life, reason]Vselennaia, zhizn', razum. Moskva, Izd-vo Akad. nauk SSSR, 1962. 238 p.   (MIRA 16:2)
                    (Plurality of worlds)

SHKLOVSKIY, Iosif Samuilovich; RAKHLIN, I.Ye., red.; BRUDNO, K.F.,
tekhn. red.

[Physics of the solar corona] Fizika solnechnoi korony. Izd.2.,
perer. i dop. Moskva, Gos. izd-vo fiziko-matem. lit-ry,
1962. 516 p.   (MIRA 15:4)
        (Sun—Corona)

S/033/62/039/002/002/014
E032/E314

AUTHOR: Shklovskiy, I.S.

TITLE: Supernovae explosions and the interstellar medium

PERIODICAL: Astronomicheskiy zhurnal, v. 39, no. 2, 1962,
          209 - 215

TEXT: It is pointed out that the kinetic energy of the
envelopes of supernovae is exceptionally high. In the case
of type II supernovae the mass of the envelopes may reach
several solar masses and the velocity is of the order of
$5 \times 10^8 - 7 \times 10^8$ cm/sec. The kinetic energy of the ejected
envelopes may reach up to 10^{52} erg. The envelope material
is eventually slowed down by the surrounding medium and the
kinetic energy of the envelope and the gas heated by it
continuously decreases. The problem arises therefore as to
what happens to this energy.   It is stated that this problem
has not as yet been analyzed. A review of available information
leads the present author to the conclusion that, in the case of
"young" supernovae, this energy is not transformed into radiation.
Card 1/2

Supernovae explosions ....

S/053/62/039/002/002/014
E032/E314

The author argues that a supernova explosion in an interstellar medium may be looked upon as a strong adiabatic explosion in a medium with constant specific heat. Use is made of the self-simulating solution for a strong explosion to investigate the disturbance of the interstellar medium due to the explosion. This is used to derive a new formula for the deceleration time of expanding nebulae, which are the remnants of supernovae explosions. The paper is concluded with a brief discussion of the astrophysical consequences of this new theory of disturbances induced in the interstellar medium by supernovae explosions.

ASSOCIATION: Gos. astronomicheskiy in-t im. P.K. Shternberga
               (State Astronomical Institute im. P.K.Shternberg)

SUBMITTED: May 30, 1961

Card 2/2

SHKLOVSKIY, I.S.

Nature of radio galaxies. Astron.zhur. 39 no.4:591-607 Jl-Ag
'62. (MIRA 15:7)

1. Gosudarstvennyy astronomicheskiy institut imeni P.K.Shternberga.
(Radio astronomy)   (Galaxies)

SHKLOVSKIY, I.S.

Radiogalaxies. Usp. fiz. nauk 77 no.1:3-60 My '62.   (MIRA 15:6)
(Radio astronomy)

SHKLOVSKIY, I.S.

    Distance to radio galaxy 3C-286.   Astron. tsir. no. 250:6-7 Jl '63.
                                                    (MIRA 17:5)

    1. Gosudarstvennyy astronomicheskiy institut imeni Shternberga.

SHKLOVSKII, I.S.

Remarks on the nature of jets of radio galaxies. Astron. zhur. 40
no.6:972-981 N-D '63.   (MIRA 16:12)

1. Gosudarstvennyy astronomicheskiy institut im. P.K.Shternberga.

SHKLOVSKIY, I.S., prof., astrofizik, radioastronom

Is life possible on Jupiter? Priroda 52 no.2:111 '63.

(MIRA 16:2)

(Jupiter (Planet))   (Life on other planets)

S/0030/64/000/002/0022/0028

ACCESSION NR: AP4025903

AUTHORS: Shklovskiy, I. S. (Doctor of physico-mathematical sciences)

TITLE: News about radio galaxies

SOURCE: AN SSSR. Vestnik, no. 2, 1964, 22-28

TOPIC TAGS: radio galaxy, astrophysics, radio wave, optical radiation, gravitational collapse, gravitational radius

ABSTRACT: The origin and nature of radio galaxies are considered to be the most important problems of astrophysics of the past decade. The fundamental problem is the source of the tremendous power that originates in the galactic nuclei from time to time. It has been discovered that some extragalactic sources of radio waves may be identified with star-like objects of tremendous luminosity--radio stars. These have variable brightness and linear dimensions of the optical-radiation source less than 10^{16} cm. On the explosion of a super-star some part of the mass apparently separates off and begins to expand at a rate on the order of 1000 km/sec. Within the part of the super-star that exceeds the mass of the ejected envelope, catastrophic compression begins. During this collapse, the central part

Card 1/2

ACCESSION NR: AP4025903

approximates in size the so-called gravitational radius, and on the surface of this sphere the second cosmic velocity is equal to the velocity of light. The gravitational radius is proportional to the mass of the compressed body. This would be about 3 km for a mass equal to that of the sun, and for a mass $3 \cdot 10^7$ times that of the sun, the radius would be about 10^{13} cm. Such a mass could not be observed, but it would exert a tremendous gravitational force, and the density near the core might be considerable. Orig. art. has: 4 figures.

ASSOCIATION: none

SUBMITTED: 00   DATE ACQ: 08Apr64   ENCL: 00

SUB CODE: AA   NO REF SOV: 001   OTHER: 000

Card 2/2

SHKLOVSKIY, I.S.

Nature of solar X-ray emission. Astron. zhur. 41 no.4:676-683
Jl-Ag '64   (MIRA 17:8)

1. Gosudarstvennyy astronomicheskiy institut im.

ACCESSION NR: AP4034535   S/0020/64/155/005/1039/1041

AUTHOR: Shklovskiy, I. S.; Kardashev, N. S.

TITLE: Gravitational waves and "superstars"

SOURCE: AN SSSR. Doklady*, v. 155, no. 5, 1964, 1039-1041

TOPIC TAGS: superstar, collapsing star, gravitational collapse, gravitational wave, general relativity theory, cosmic ray, radio star, energy transformation, gravitational energy

ABSTRACT: Starlike objects, identified with point radio sources, have been recently discovered. They are believed to have masses many million times the sun mass and to be of less than 10^{16}cm in diameter. The authors discuss some results of the general theory of relativity that might be applicable to this superstar and to their gravitational collapse. The intensive radiation of gravitational waves must greatly affect the energy balance. By using a simple model for the collapsing star (a rod) and by considering the gradual increase of rotation due to conservation of angular momentum, a gravitational emission is computed to be in the order of 10^{54}erg/sec. A similar result is obtained for

Card   1/2

SHKLOVSKIY, I.S.

Physical con... ions in the ga...e: envelope of 3C-273. Astron.zhur.
41 no.5:801-80.. S-O '64.

Gosudarstvennyy astron...ch...ij institut im. P.K.Shternberga.
(MIRA 17:10)

L 64067-65   FSS-2/EWT(1)/EEC(m)/FS(v)-3/EWG(v)/FCC/EEC-4/EWA(h)   TT/GW

UR/0384/65/000/003/0002/0007

ACCESSION NR: AP5018434

AUTHOR: Shklovskiy, I. S. (Professor)

TITLE: X-ray astronomy

SOURCE: Zemlya i Vselennaya, no. 3, 1965, 2-7

29
B

TOPIC TAGS: spacecraft instrumentation, solar x radiation, x radiation

ABSTRACT: The study of the ultraviolet and x-ray spectra of the Sun and stars yields valuable information concerning their chemical composition and the physical conditions of their surface layers. The only way of investigating the radiation of celestial bodies in the shortwave region of the spectrum is to lift special instruments to very high altitudes, i. e., hundreds of kilometers. Direct access to the upper atmosphere for scientific purposes, which has only come about in the past two decades, has laid the foundations for rocket and satellite astronomy. That branch of rocket and satellite astronomy dealing with stellar x radiation is called x-ray astronomy.

Card 1/4

L 64067-65
ACCESSION NR: AP5018434   O

Since x-rays are neither refracted nor reflected by a mirror, such astro-
nomical instruments as the telescope and spectrograph have been replaced in
x-ray astronomy by supersensitive counters. These counters are coated with
special substances which absorb low-energy x-ray quanta and allow the fairly
high energy quanta to pass through. The resolution of today's x-ray astron-
omy, however, is very low.

Most of the Sun's x radiation originates in the corona and in certain active
regions of the chromosphere. This has been conclusively demonstrated by
special studies carried out during a solar eclipse. In these studies, rocket-
borne instruments have continuously registered the solar x-ray flux and trans-
mitted the readings back to Earth by telemetry. Since the readings did not
drop to zero it was inferred that x radiation originates in the solar atmosphere
beyond the visible surface of the Sun, i.e., during an eclipse.

In 1963 a group of American scientists associated with the Naval Research
Laboratory, headed by Professor H. Friedman, discovered two x radiation

Card 2/4

L 64067-65

ACCESSION NR: AP5018434

sources: one in Taurus constellation of the Crab nebula and another, eight times as powerful, in the Scorpio constellation. Some ten years ago, Shklov-sky pointed to the common, although somewhat unusual, property of the optical and radio-frequency radiation from the Crab nebula. Electromagnetic waves are emitted by so-called relativistic electrons (i. e., electrons whose energy considerably exceeds mc^2—the energy of a quiescent electron) moving in the magnetic field which permeates this nebula (synchrotron radiation). Whereas radio waves are emitted by relativistic electrons in the energy range of 10^8-10^9 ev, the optical radiation of the Crab nebula is produced by fewer electrons of a higher energy (about $3 \cdot 10^{11}$ ev).

Particle acceleration by electromagnetic mechanisms within our galaxy presents one of the major problems in astrophysics at the present time. The most recent detection by Friedman's group of ten more x-radiation sources near the galactic equator has led to the surmise that there are about

Card 3/4

L 64067-65

ACCESSION NR: AP5018434   d

100 x radiation sources of this type in our galaxy. Knowing the approximate
distance to these strange objects and the amount of x radiation they are
sending to Earth, their total intensity can be estimated at several thousand
times that of solar radiation on all wavelengths. Shklovskiy believes that x
radiation has its origin in the neutron stars. These must be the end product
of stellar evolution, and their surfaces cool off at a fast rate (within a few hun-
dred years). Considering the short life-span of a neutron star at a temperature
of about 10 million degrees, the conclusion can be made that a new neutron
star appears and soon disappears at least once every few years within our
stellar system. Several billion neutron stars are thought to have been born
during the existence of our galaxy. Orig. art. has: 3 figures.

ASSOCIATION: none

SUBMITTED: 000   ENCL: 00   SUB CODE: AA

NR REF SOV: 000   OTHER: 000   ATD Press: 4065-F

Card 4/4

L 5170-66   EWT(1)/FS(v)-3   GS/GW

ACC NR: AT5024308   SOURCE CODE: UR/0000/65/000/000/0015/0034

AUTHOR: Shklovskiy, I. S.

ORG: State Astronomical Institute im. P. K. Shternberg, MGU, Moscow (Gosudarstvennyy astronomicheskiy institut, MGU)

TITLE: The number of inhabited worlds and the problem of establishing contacts among them

SOURCE: Vsesoyuznoye soveshchaniye, posvyashchennoye probleme vnezemnykh tsivilizatsiy. 1st Byurakan, 1964. Vnezemnyye tsivilizatsii (Extraterrestrial civilizations); trudy soveshchaniya. Yerevan, Izd-vo AN ArmSSR, 1965, 15-34

TOPIC TAGS: astronometry, galactic radiation, galactic structure, astrophysics, radio astronomy, planet, planetary environment, planetary life

ABSTRACT: The author discusses the likelihood of the existence of inhabited planets and the problem of establishing contact with civilizations on other planets. Mention is made of some concrete achievements of science in the serious

Card 1/2

L 5170-66
ACC NR: AT5024308   /O

evaluation of likelihood of extraterrestrial life. Recent research indicates a
large scattering of planetary systems in our galaxy, and reference is made to the
discoveries of Van de Camp in the field of photographic astrometry. Further
information on the nature of life, its origins and development, comes from the
study of molecular biology, biophysics, and biochemistry. A third important area
of research is the field of radio astronomy. Of special importance for establish-
ing interplanetary communication is the development of quantum amplifiers of
radiation (masers) and of antenna devices with large equivalent surfaces. Devel-
opments in the field of cybernetics are important for complex analyses, for au-
tomata problems, and for the creation of quasi-rational machine forms of "life".
The question of existence of higher forms of life on other planets is approached
from the consideration of what is necessary in a world to generate rational life.
The author takes the viewpoint that, in spite of a possibly long and continuous
evolution, the chances of existence of a rational form are still small for a
single planet. Several philosophical and technological aspects of interstellar
communication by travel and by electromagnetic radiation are discussed. The com-
ments and recommendations of G. A. Gurzadyan, Ya. B. Zel'dovich, V. A. Kotel'nikov,
B. V. Kukarkin, and D. Ya. Martynov concerning the content of the article are
given. Orig. art. has: 1 equation and 1 figure.
SUB CODE: AA/ SUBM DATE: 26May65/
Card 2/2 hcd

SHKLOVSKIY, I.S.

Possible secular variation of the flux and spectrum of radio
emission from the source 1934-63. Astron. zhur. 42 no.1:30-32
Ja-F '65.   (MIRA 18:2)

1. Gosudatstvennyy astronomicheskiy institut im. P.K. Shternberga.

SHKLOVSKIY, I.S.

Supernova of 1054 - a double star? Dokl, AN SSSR 160 no.1:54-56
Ja '65.   (MIRA 18:2)

1. Gosudarstvennyy astronomicheskiy institut im. P.K. Shternberga.
Submitted August 5, 1964.

Note on the nature of the X-ray sources. Astron.zhur. 43

Gosudarstvennyy astronom... skiy institut im. P.K. Shternberga.

(MIRA 18:10)

L 14111-66   EWT(1)   GW

ACC NR: AR5018941   SOURCE CODE: UR/0269/65/000/007/0039/0039

AUTHOR: Shklovskiy, I.S.

ORG: none

TITLE: The reason for the absence of flares of the Supernova II type in the irregular galaxies

SOURCE: Ref. zh. Astronomiya. Otdel'nyy vypusk, Abs. 7.51.333

REF SOURCE: Astron. tsirkulyar, no. 312, yanv. 12, 1965, 4-6

TOPIC TAGS: galaxy, galactic structure, galactic radiation, hot star, galaxy spectrum

TRANSLATION: Possible reasons are discussed for the absence of flares of Supernova II type in irregular galaxies. The hypothesis is offered that a reason may be found in the great variations in the velocity of axial rotation of the stars of early spectral classes (potentials of Supernova II type) and in the irregular and spiral galaxies. In irregular galaxies, due to conditions causing the formation of massive hot stars out of the interstellar medium, the velocity of their rotation is possibly too low. This may perhaps explain the abnormally high luminosity of Supernova I type in irregular galaxies. A verification of this hypothesis, with the help of a spectroscopic study of Magellan Clouds, is desirable. M. Frolov.

SUB CODE: 03

Card 1/1   UDC: 523.855

2

SHKLOVSKIY, I.S.

Comments on the spectrum of synchrotron radiation of the
Crab nebula. Astron. zhur. 43 no. 1:10-12 Ja -F '66
(MIRA 19:2)

1. Gosudarstvennyy astronomicheskiy institut imeni
P.K. Shternberga. Submitted October 20, 1965.

L 02450-67   ЕWT(1)   GW

ACC NR: AP6028789   SOURCE CODE: UR/0033/66/043/004/0747/0753

AUTHOR: Shklovskiy, I. S.   39

                                                                  B
ORG: State Astronomical Institute im. P. K. Shternberg (Gos. astronomicheskiy in-t)

TITLE: Comments on the remnants of supernovae outbursts

SOURCE: Astronomicheskiy zhurnal, v. 43, no. 4, 1966, 747-753

TOPIC TAGS: supernova,   radio astronomy, galaxy

ABSTRACT: As a result of the pressure of very hot plasma, it is argued that the
coronal line emission, particulary at $\lambda = 5303$ (Fe XIV), should be observable in some
"old" remnants of type-II supernovae outbursts. Appreciable fluxes of soft x-ray
quanta can be expected from younger remnants of type II supernovae outbursts (parti-
cularly from Cas-A). An independent determination is made of the distance to the LMC
by the radioastronomical method based on an analysis of observed sources -- remnants
of type-II supernovae. The frequency of such outbursts in the LMC is estimated to be
about one every 10,000 yr. The theoretical luminosity function of remnants of type-II
supernovae outbursts of a given glaxy is determined. Orig. art. has: 12 formulas.

SUB CODE: 03/ SUBM DATE: 07Feb66/ ORIG REF: 005/ OTH REF: 004

Card 1/1 gd   UDC: 523.841.1

ACC NR: AR6034593   SOURCE CODE: UR/0269/66/000/008/0045/0045

AUTHOR: Shklovskiy, I. S.

TITLE: Remanent radiation of the universe and population of the rotational levels of interstellar molecules

SOURCE: Ref. zh. Astronomiya, Abs. 8.51.376

REF SOURCE: Astron. tsirkulyar, no. 364, marta 29, 1966, 1-3

TOPIC TAGS: molecule, optic thickness, stellar population, intergalactic space, interstellar space, remanent radio emission

ABSTRACT: The influence of remanent radio emission on the condition of matter in intergalactic and interstellar space is analyzed. It is pointed out that the population of low rotational levels of interstellar molecules must be regulated by remanent Planchian radiation at a temperature of T_p = 3 degrees K. The probability of radiation absorption by the CN molecule and the optic thickness in the line λ = 0.26 cm were calculated. Theoretical results agree well with results of the Adams definition ("Astroph. J", 1941, 93, 11) of the excitation temperature of CN $T \sim$ 2.3 degrees K of the rotational line. Until lately, the Adams observations

Card 1/2   UDC: 523.164.4

ACC NR: AR6035288   SOURCE CODE: UR/0269/66/000/009/0033/0033

AUTHOR: Shklovskiy, I. S.

TITLE: Possibility of determining the content of relativistic protons in some cosmic sources of synchrotron radiation

SOURCE: Ref. zh. Astronomiya, Abs. 9.51.292

REF SOURCE: Astron. tsirkulyar, no. 364, marta 29, 1966, 4-7

TOPIC TAGS: proton, x ray emission, electron interaction, synchrotron, proton

ABSTRACT: The author investigated the possibility of generating hard x-ray emission as a result of interaction of relativistic electron in sources of synchrotron radiation, with photons of the relict level. The detection of hard x-ray emission in an interval of 1.7—8.7 A (generated by relativistic electrons with an energy of 10^8—10^9 ev) would allow (with some additional suppositions) the determination of the relativistic proton content of a number of sources. The Centaurus A radiation source is suggested as most convenient for such an experiment. Bibliography of 7 titles. G. Sholomitskiy. [Translation of abstract] [NT]
SUB CODE: 03/

Card 1/1   UDC: 523.165

ACC NR: AP7008801   SOURCE CODE: UR/0033/67/044/001/0058/0066

AUTHOR: Shklovskiy, I. S.

ORG: State Astronomical Inst. im. P. K. Shternberg (Gosudarstvennyy astronomicheskiy institut)

TITLE: The nature of the x-ray radiation of Galaxies

SOURCE: Astronomicheskiy zhurnal, v. 44, no. 1, 1967, 58-66

TOPIC TAGS: galaxy, x ray emission, galactic radiation, thermal radiation, cosmic radio source, dense plasma

ABSTRACT: The possible mechanism of x-ray emission of the radio galaxies Cyg A and Vir A is analyzed. For this purpose, the physical conditions in the "optical" condensations of Cyg A and in particular, the mass of the gas $(1-3) \cdot 10^8$ M are investigated. The possible cause of x-ray emission of Cyg A may be thermal (decelerating) radiation in the central part of this source. The continuation of this radiation into the optical range is the observed continuous spectrum of the central part of Cyg A. The mass of hot plasma $(T_e = 5.10^7)$ should exceed 10^{11} M. Comparatively dense, cold condensation in this plasma causes the optical radiation. By nature, these condensations are similar to "stationary condensations." Another possible cause of x-ray emission

Card 1/2   UDC: 523.164.42

of Cyg A may be the continuing activity of its nucleus, the dimensions of which should be very small. The situation may be similar in the case of Vir A, although the possibility that x-ray radiation of this object can be a high-frequency continuation of the synchrotron radiation of the object is evidently more probable. If the x-ray radiation source of radio galaxies is connected with the continuing activity of their nuclei, a variability of the flux of this radiation may be expected. Orig. art. has: 6 formulas and 1 figure.   [BA]

SUB CODE: 03/ SUBM DATE: 10Apr66/ ORIG REF: 009/ OTH REF: 009

Card 2/2

DUDKIN, M.S.; SHKLOVSKIY, I.Sh.

Production of fodder yeasts from wheat wastes. Izv. vys. ucheb.
zav.;pishch. tekh. no.3:44-47 '60.   (MIRA 14:8)

1. Odesskiy tekhnologicheskiy institut im. I.V. Stalina, Kafedra
organicheskoy khimii.
                    (Yeast) (Wheat)

SHKLOVSKIY, I.Sh., dots., kand.khim.nauk

Mechanism of gluten formation. [Trudy] VNIIZ no.35:112-118 '58.
(MIRA 11:10)

1. Odesskiy tekhnologicheskiy institut imeni I.V. Stalina.
(Gluten)

DUDKIN, M.S.; SHKLOVSKIY, I.Sh.

Hydrolysis of hemicelluloses in the lemmas of barley. Izv. vys.
ucheb. zav.; pishch. tekh. no.1:36-42 '58.   (MIRA 11:8)

1. Odesskiy tekhnologicheskiy institut imeni I.V. Stalina, Kafedra
organicheskoy khimii.
                (Barley)   (Hemicellulose)   (Hydrolysis)

L 11539-66   EWT(1)   GW

ACC NR: AR5011847

UR/0269/65/000/004/0042/0042
523.164.4

23
3

SOURCE: Ref. zh. Astronomiya. Otd. vyp., Abs. 4.51.296

AUTHOR: Shklovskiy, I.S.

TITLE: New method for evaluating the density of intergalactic gas

CITED SOURCE: Astron. tsirkulyar, no. 303, iunya 12, 1964, 3-6

TOPIC TAGS: galactic, galactic mass, spectral line, resonance line, galaxy

TRANSLATION: A new method is proposed for evaluating the density of intergalactic gas based on MgII (λ 2800). Since the second potential of Mg ionization is fairly high, the ratio of MgII/MgIII would be no smaller than that of HI/HII. In areas of neutral hydrogene, magnium must be primarily in an MgII state, and in the spectra of quasistellar objects the absorption of the MgII resonance line should be observable. Because such an absorption is not seen, it is possible to evaluate the density of the intergalactic Mg and thence, considering the problem of its relative abundance, the density of H. The sensitivity of this new method is at least 10 times higher than that of the radio method. Bibliography: 8

SUB CODE: 03

Card   1/1

SHKLOVSKIY, I.Sh., kand.khimicheskikh nauk, dotsent

Effect of some reducing agents on the gluten of flour pretreated with ethanol, oleic acid, formalin, and copper sulfate. Trudy VNIIZ no.38:183-192 '60.   (MIRA 15:12)

1. Odesskiy tekhnologicheskiy institut imeni Stalina.
        (Gluten)   (Reducing agents)

SHKLOVSKIY, I.Sh., kand.khimicheskikh nauk, dotsent

Effect of some reducing agents on the gluten and baking qualities of flour from overheated grain. Trudy VNIIZ no.38:193-199 '60.

(MIRA 15:12)

1. Odesskiy tekhnologicheskiy institut imeni Stalina.
     (Gluten)   (Reducing agents)

LIVOVSKIY, P.G.; PAL'MOV, Ye.V., professor doktor, retsenzent; KRASNOV,
    K.V., inzhener, retsenzent; ZAKROCHINSKIY, S.V., inzhener, retsenzent;
    SHKLOVSKIY, M.B., inzhener, retsenzent; BOGACHEV, I.N., professor
    doktor tekhnicheskikh nauk, redaktor; AKHUN, A.I., kandidat tekhni-
    cheskikh nauk, redaktor; BARANOV, V.M., kandidat tekhnicheskikh nauk,
    redaktor; RYZHIKOV, A.A., kandidat tekhnicheskikh nauk, redaktor;
    FILIPPOV, A.S., kandidat tekhnicheskikh nauk, redaktor; CHERNOBROVKIN,
    V.P., kandidat tekhnicheskikh nauk, redaktor; YAKUTOVICH, M.V., kandi-
    dat tekhnicheskikh nauk, redaktor; GRISHCHENKO, M.F., inzhener, redak.r;
    ZASLAVSKIY, I.A., inzhener, redaktor; KROKHALEV, V.Z., inzhener, redak-
    tor; SOSKIN, M.D., inzhener, redaktor.

[Manual for the mechanic in a metallurgical plant] Spravochnoe ruko-
vodstvo mekhanika metallurgicheskogo zavoda. Izd.3., ispr.1 dop.
Moskva, Gos. nauchno-tekhn. izd-vo lit-ry po chernoi i tsvetnoi metal-
lurgii, 1953. 1112 p.   (MLRA 7:4)
            (Mechanical engineering--Handbooks, manuals, etc.)

SHKLOVSKIY, M.I.

Magnetometers for mass control of small permanent magnets. Priboro-
stroenie no.1:27 Ja '57.   (MLRA 10:4)
                        (Magnetometer)

SHKLOVSKIY, M.I., inzhener.

Optimum relations of elements in a magnetic circuit of electro-
magnetic time relays. Vest. elektroprom. 28 no.3:50-53 Mr '57.
(MIRA 10:4)

1. Cheboksarskiy elektroapparatnyy zavod.
   (Electric relays)

J7

PHASE I BOOK EXPLOITATION   SOV/5460

Leningradskiy metallicheskiy zavod. Otdel tekhnicheskoy informatsii.

Nekotoryye voprosy tekhnologii proizvodstva turbin (Certain Problems
in the Manufacture of Turbines) Moscow, Mashgiz, 1960. 398 p.
(Series: Its: Trudy, vyp. 7) Errata slip inserted. 2,100 copies
printed.

Sponsoring Agency: RSFSR. Sovet narodnogo khozyaystva Leningrad-
skogo ekonomicheskogo administrativnogo rayona, Upravleniye
tyazhelogo mashinostroyeniya, and Leningradskiy dvazhdy ordena
Lenina metallicheskiy zavod. Otdel tekhnicheskoy informatsii.

Ed. (Title page): G. A. Drobilko; Editorial Board: Resp. Ed.: G. A.
Drobilko, B. A. Glebov, A. M. Mayzel', and N. Kh. Mernik; Tech.
Ed.: A. I. Kontorovich; Managing Ed. for Literature on Machine-
Building Technology: Ye. P. Naumov, Engineer, Leningrad Depart-
ment, Mashgiz.

PURPOSE: This collection of articles is intended for technical
personnel in turbine plants, institutes, planning organizations,
as well as for production innovators.

Card 1/12

Certain Problems   (Cont.)   SOV/5460

COVERAGE: The experience of the LMZ (Leningradskiy metallicheskiy
   zavod - Leningrad Metalworking Plant) in the manufacture of modern
   large-capacity turbines is presented. Methods for the rationali-
   zation of basic manufacturing processes and for the mechanization and
   automation of manual operations are given. Descriptions of attach-
   ments and tools designed by LMZ for improving labor productivity
   and product quality are provided, and advanced inspection methods
   discussed. References accompany some articles. No personalities
   are mentioned. There are 26 references: 25 Soviet and 1 English.

TABLE OF CONTENTS:

Card 2/12

Certain Problems (Cont.)   SOV/5460

7

         II. THE MECHANIZATION AND AUTOMATION
              OF LABOR-CONSUMING OPERATIONS

Card 4/12

TASHLITSKIY, N.I.; SHKLOVSKIY, M.M.

New design of large end-milling cutters. Stan.i instr. 34 no.4:
36 Ap '63.   (Metal-cutting tools)   (MIRA 16:3)

L'VOVSKIY, Pavel Grigor'yevich; PAL'KOV, Ye.V., prof., doktor tekhn. nauk, retsenzent; SHKLOVSKIY, M.V., inzh., retsenzent; GURVITS, A.I., inzh., retsenzent; NOSENKO, S.M., inzh., retsenzent; SAKHARIN, N.N., inzh., retsenzent; SOSKIN, M.D., inzh., red.; BALAZOVSKIY, M.Ya., inzh., red.; CHAPAYKINA, F.K. red. izd-va; KRYZHOVA, M.L., red.izd-va; MATLYUK, R.M., tekhn. red.; TURKINA, Ye.D., tekhn. red.

[Manual for mechanics in metallurgical plants] Spravochnoe rukovodstvo mekhanika metallurgicheskogo zavoda. Izd.4., ispr. i dop. Sverdlovsk, Metallurgizdat, 1961. 1105 p.   (MIRA 15:3)
(Mechanical engineering)
(Metallurgical plants—Equipment and supplies)

IVANOV, F.M., inzh.; KUTSENKO, V.N., inzh.; NOVIKOV, Ya.N., inzh.;
SHKLOVSKIY, M.Ya., inzh.

Use of polyvinyl chloride plastics for the waterproofing of bridges.
Transp.stroi. 11 no.3:23-24 Mr '61.   (MIRA 14:3)
(Waterproofing) (Bridge construction) (Ethylene)

SHKLOVSKIY, M.Ya., inzh,; PETRISHCHEV, V.B., inzh.; KOSTELYNAETS, B.A.,inzh.;
OBOZINSKIY, S.M., inzh.

Construction of bridge footings made of reinforced concrete shells in
deposits of gravel and boulders. Transp. stroi. 12 no.11:23-25 N '62.
(MIRA 15:12)

1. Mostostryo No.2 (for Shklovskiy). 2. Mostopoyezd No.465
Mostostroya No.2 (for Petrishchev). 3. Tomgiprotrans (for Kostelyanets,
Obozinskiy).
(Bridges—Foundations and piers) (Precast concrete construction)

SHKLOVSKIY, M. Ya.

Assembly of 33.5 m. spans using the GEK-120 swing crane.
Transp. stroi. 13 no.3:17-19 Mr '63.   (MIRA 16:4)

1. Glavnyy tekhnolog Mostostroitel'nogo tresta No. 2.

(Bridge construction)
(Cranes, derricks, etc.)

SHKLOVSKIY, M. Ya.; CHERKASOV, A. N.; FISHLER, B. N.

The GEPK-130-17.5 swing cantilever railroad crane. Transp.
stroi. 13 no.4:34-36 Ap '63.   (MIRA 16:4)

1. Glavnyy tekhnolog mostostroitel'nogo tresta No. 2 (for
Shklovskiy). 2. Starshiy inzhener Vsesoyuznogo nauchno-
issledovatel'skogo institut transportnogo stroitel'stva
Ministerstva transportnogo stroitel'stva (for Cherkasov).
3. Vedushchiy konstruktor Uglichskogo remontno-mekhanicheskogo
zavoda (for Fishler).

     (Cranes, derricks, etc.)
     (Bridge construction—Equipment and supplies)

VYPOV, I.G., inzh.; KOTER, V.A., inzh.; SHKLOVSKIY, M.Ya., inzh.

Installing bridge foundations on shelled piles with widening
by underground explosion. Transp.stroi. 13 no.10:14-17
O '63.   (MIRA 17:8)